

In the United States Patent and Trademark Office

Serial No. _____

Appn. Filed : _____

Applicant: Victor Faybushenko and Ashley Burfield

Appn. Title: HEAT-TRANSFER INTERFACE DEVICE BETWEEN A SOURCE
OF HEAT AND A HEAT-RECEIVING OBJECT

Examiner/GAU: _____

Mailed:

At: San Carlos, CA

Information Disclosure Statement

Assistant Commissioner for Patents

Washington, District of Columbia 20231

Sir:

Attached is a completed Form PTO-1449 and copies of the pertinent parts of the references cited thereon. Following are comments on references pursuant to Rule 98:

U.S. Patent No. 6,422,172 issued in 2002 to J. Tanaka, et al. discloses an ICP reactor with a flat spiral RF coil placed onto the top of the plasma reactor. Reactors of this type are also described in "Industrial Plasma Engineering" by J.

Reece Roth, Vol. 1, Institute of Physics Publishing, 1995, pp. 412-413. The RF coils of this ICP reactor work under very severe thermal-exchange conditions required for removal of the excessive heat. In existing devices of the aforementioned type the thermal interface between the heat source and the heat-receiving object is carried out either through rigid contact or by utilizing thermally conductive elastic insulators such as, e.g., T-gon 200 Series insulators produced by Thermagon, Inc., OH, USA. However, the best thermally conductive elastic insulators of the aforementioned type are rated maximum to 200°C and therefore are not applicable for high-temperature applications such as those close to 350°C. The difference in coefficients of thermal expansion between the materials of the mating parts in the thermal interface causes significant relative displacements, e.g., between RF coil and the reactor cover, and this results in violation of the plasma distribution pattern on the treated object, such as a semiconductor substrate. Another consequence of such differences in coefficients of thermal expansion is thermal warping of the contacting parts.

It should be noted that in apparatuses such as RF plasma reactors that utilize vacuum in working chambers the vacuum generate an additional force acting in the direction of violation of the interface. The above condition is aggravated with the raise of the working temperature whereby the sagging of the vacuum chamber walls is increased.

The applicant is not aware of any existing heat-transfer devices that maintain stable heat-transfer contact between parts subject to significant thermal deformations and operating under temperatures up to 350°C.

Thus, none of the references known to the applicants discloses, as claimed in our main Claim 1 with defendant Claims 2 to 39, a method for controlling and stabilizing heat-transfer conditions between a source of heat and a heat-receiving object that consists in providing a heat-transfer interface device in the form of an elastomeric material filled with an electrically-nonconductive and thermally-

conductive filler, providing the heat-transfer elastomeric device a space that can be filled with the elastomeric material during redistribution of this material under the effect of thermal deformations, and using the elastomeric device in a compressed state, the device at working temperatures up to 320°C, the elastomeric materials comprising a perfluoroelastomer polymer, and the filling materials being selected from boron nitride, aluminum nitride, beryllium oxide, and carbon. Furthermore, none of the references known to the applicants discloses, as claimed in our main Claim 40 and dependant Claims 41 to 75, an heat-transfer interface device for use in a range of working temperatures up to 320°C, which made from an elastomeric material filled with an electrically-nonconductive and thermally-conductive filler material, said elastomeric material being located between a source of heat and a heat-receiving object, the elastomeric material being compressed and having a slot or another free space for redistribution of the material under the effect of thermal deformations, the elastomeric materials comprising a perfluoroelastomer polymer, and the filling materials being selected from boron nitride, aluminum nitride, beryllium oxide, and carbon.

Applicants:

Pacific Rubber Company

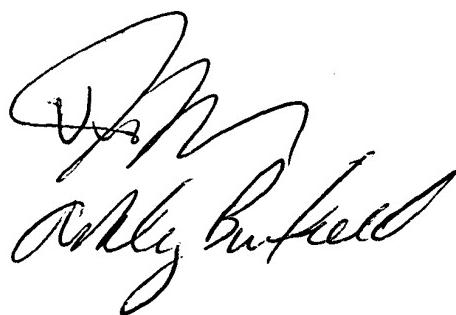
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October 2/2003

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>				Application Number	
				Filing Date	
				First Named Inventor	VICTOR Paybischenko
				Art Unit	
				Examiner Name	
				Attorney Docket Number	
Sheet	1	of	2		

U.S. PATENT DOCUMENTS

FOREIGN PATENT DOCUMENTS

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	
				Filing Date	
				First Named Inventor	<i>Victor Faybischenko</i>
				Art Unit	
				Examiner Name	
				Attorney Docket Number	
(Use as many sheets as necessary)					
Sheet	2	of	2		

NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	2.	"Industrial Plasma Engineering" by J. Reece Roth, Vol-1, Institute of physics Publishing, 1995, No. 972-413
	3.	T-gon 200 Series Insulators of Thermagon, Inc., OH, USA
	4.	Catalogs of Mold-Tech, Standex-Engraving Group

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

1 Applicant's unique citation designation number (optional). **2** Applicant is to place a check mark here if English language translation is attached.
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